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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/055,487	10/29/2001	Robert Burgess	10015534	7488

7590 11/12/2004
HEWLETT-PACKARD COMPANY
Intellectual Property Administration
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EXAMINER

RUGGLES, JOHN S

ART UNIT PAPER NUMBER

1756

DATE MAILED: 11/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/055,487

Applicant(s)

BURGESS, ROBERT

Examiner

John Ruggles

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) 8-21, 24, 46 and 47 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 29, 30, 35-45 and 48-56 is/are allowed.
- 6) ☒ Claim(s) 1-7, 22, 23, 25-28 and 31-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Claims 1, 5-6, 22, 25-28, 30-34, 36-38, 41-42, 44-45, 48-53, and 55-56 remain as previously presented; claims 2-4, 7, and 23 remain as originally filed; claims 8-21, 24, and 46-47 remain withdrawn as non-elected; and claims 29, 35, 39-40, 43, 47, and 54 have been currently amended. Therefore, only claims 1-7, 22-23, 25-45, and 48-56 remain under consideration.

Claim Rejections - 35 USC § 112

The previous rejection of claims 35 and 37-45 under the first paragraph of 35 U.S.C. 112 has been overcome by amendment of claim 35, on which claims 37-45 depend. Accordingly, this previous rejection is now withdrawn.

The previous rejection under the second paragraph of 35 U.S.C. 112 has also been overcome by claim amendments and is therefore also withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder, et al. (US Patent 5,303,141), especially in view of Lawton (US Patent 5,980,812).

Batchelder describes a process and apparatus for fabricating a three-dimensional solid object by extrusion of light or heat curable building material through a scanning extrusion nozzle orifice as an applicator (e.g., for spraying, etc.) to build up successive layers as shown in Figures 1A and 2A and described at column 4, lines 37-65 and column 5, line 59 to column 6, line 6. Column 6, lines 25-28 describe alternative use of a nozzle applicator having three or more degrees of movement, which may make movement of the building material support table 16 unnecessary (encompassing the raising of the applicator nozzle with each successive layer of deposited building material of instant claim 22). In the case of composite structures composed of a number of sub-structures, each sub-structure is selectively made from the material appropriate to the function of that sub-structure. A multi-nozzle system can be employed to build composite structures (column 6, lines 56-61). Curing of the building material is initiated as it is extruded from each scanning nozzle orifice by coupling a laser or radiant lamp having an associated focusing reflector (baffle) to the scanning nozzle (column 7, lines 12-22). The deposited building material is imaged by a plurality of laser diodes to generate a sheet of light having a thickness corresponding to that of the deposited bead of building material and a width corresponding to the width of the imaging objective (even though described for use in visual image feedback sensing, this combination is also understood to be useful for the laser light curing means having associated light focusing reflectors, baffles, or lenses coupled to each scanning nozzle in which the laser light sources are laser diode light-

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emitting centers (e.g., LED's, etc.), column 9, lines 57-66). Rules for placement of each deposited layer formed from extruded and cured building material can ensure maximum smoothness of each layer before deposition of the next successive layer (column 13, lines 31-51).

While meeting other limitations of instant claims 1-2, 5, and 22, Batchelder does not specifically require depositing uniform layers of building material (instant claims 1-2, 5, and 22) using a printing cartridge that includes an orifice plate (instant claims 3-4). However, it would still have been obvious to one of ordinary skill in the art at the time the invention was made to have used uniform layers of building material, because Batchelder provides rules for ensuring maximum smoothness of each layer of building material before deposition of the next successive layer thereof (instant claims 1-2, 5, and 22).

Lawton shows a process for fabricating a three-dimensional solid object by building up layers formed by ink jet or powder jet technology and subsequent selective laser diode scanned imaging to cure the building material (column 10, lines 41-42 and column 16, line 32). Ink jet technology encompasses ink jet printing using a printing cartridge that includes an orifice plate for selectively spraying the building material. Alternatively, the building material 105 can be evenly spread or made uniform by sliding a doctor blade 104 having edge 104' over deposited building material 106, before scanned imaging by beam 107 to selectively cure areas 108 of uniform layer 106 (see Figure 1 as described at column 6, line 52 to column 7, line 20).

It would especially have been obvious to one of ordinary skill in the art at the time the invention was made to form uniform layers of building material by using a printing

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cartridge having an orifice plate such as found in ink jet printers to apply or spray the building material followed by smoothing with a sliding doctor blade to form a uniform layer of building material as shown by Lawton; the printing cartridge being modified to include laser diodes and associated focusing lenses at nozzle locations set at predetermined distances from the laser diodes to focus light on the applied building material for curing, as suggested by Batchelder (instant claims 3-4). This is because Batchelder and Lawton relate to the same art of coating and selective curing of successive smooth or uniform layers of building material and because Lawton further shows use of a sliding doctor blade to ensure smooth uniformity of each successive layer of building material before selective curing thereof (instant claims 1-5 and 22).

Claims 6-7 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder especially in view of Lawton and further in view of Gelbart (US Patent 6,214,276).

While describing fabrication of a solid article by photocuring successive uniform layers of building material using a moving nozzle orifice with coupled laser diodes and focusing lenses, Batchelder and Lawton do not specify additional steps of curing the article (apart from initial curing to solidify each layer) and rinsing non-polymerized building material from the article.

Gelbart teaches a method of fabricating three-dimensional objects using plural laser diodes for selective curing by polymerization of a liquid precursor building material, layer-by-layer. The initial curing of successive layers to solidify the building material is sometimes followed by baking or UV exposure for further curing and washing

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to remove uncured, non-polymerized building material (column 4, line 53 to column 5, line 35).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to follow the layered building process as taught by Batchelder and Lawton with additional post-building steps of further curing to harden the solid portions and washing or rinsing to remove non-polymerized building material from the article, as taught by Gelbart. This is because Batchelder, Lawton, and Gelbart all relate to the same art of coating and selective curing of successive layers of building material to form a three-dimensional solid object.

Claims 25-28 and 31-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Batchelder especially in view of Lawton, further in view of Gelbart, further in view of Lin (US Patent 5,764,263), and further in view of Mercer (US Patent 4,029,006).

While describing fabrication of a solid article by photocuring successive uniform layers of building material using a moving nozzle orifice with coupled laser diodes and focusing lenses followed by subsequent additional baking or curing and washing or rinsing to remove uncured building material, Batchelder, Lawton, and Gelbart do not specifically teach automatic transport of the photocured building material to a separate curing unit.

Lin discloses an ink jet printing process and apparatus for reducing curl of a coated substrate (understood to include enhancement of flatness, smoothness, and uniformity of the coated substrate) by coating of single or plural layers (title and

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abstract). The ink jet printing is preferably carried out with one or more thermal ink print heads 22, 24, 27, and/or 29 (each understood to have one or more nozzle orifices for ejection of ink heated by firing resistors, which are driven by control circuitry) for selective spraying of coating material onto the substrate (Figure 2 and column 6, lines 56-64). Other suitable types of printing include using a pen plotter, continuous stream ink jet printing, drop-on-demand ink jet printing (e.g., piezoelectric, acoustic, etc. types). Heat may be applied to the substrate S_d at any location, including before, during, and after application of coating material. Heaters 25, 30, 31, 32, 33, and 34 can be any type of conventional heating means (e.g., lamps, laser diodes, etc.). Figure 2 shows transport of the substrate using advancing device 35, which may include rotating rollers, wheels, transporting device(s) for a belt or platen, and/or guiding gears (column 11, lines 13-46). This advancing device is interpreted to be programmable or automated, being operated in concert with the ink jet print heads and separate heaters in order to achieve desired patterns of cured coating material on the substrate.

Automated control of the transport means for controlled coordination with an ink jet printing head has been known in the art of ink jet printing for some time, as shown by Mercer (abstract, Figure 1, and column 4, lines 35-51).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an automatic transport between various process stations (including coating, imaging, heating, curing, and rinsing) coordinated with movement of the applicator (ink jet printing head) disclosed by Lin and Mercer in the process of Batchelder, Lawton, and Gelbart. This is because Batchelder, Lawton, and Gelbart all relate to the same art of coating and selective curing of successive layers of building

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material to form a three-dimensional solid object and also because Lawton, Lin, and Mercer all relate to the same art of coating by ink jet printing.

Allowable Subject Matter

Claims 29-30, 35-45, and 48-56 are now allowed.

Applicable statements of reasons for the indication of allowable subject matter have been previously set forth in the Office actions mailed on 18 December 2003 and 28 May 2004.

Response to Arguments

The previous rejections under the first and second paragraphs of 35 U.S.C. 112 have both been overcome by amendments to the claims, so these previous rejections have now been withdrawn, as shown above.

Claims 29-30, 35-45, and 48-56 have now been allowed, for the reasons previously set forth.

Applicant's arguments filed on 30 August 2004 regarding the remaining rejected claims have been fully considered but they are not persuasive for at least the reasons given below.

In response to Applicant's argument on pages 18-20 against the combination of Batchelder and Lawton, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references

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would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). In this case, one of ordinary skill in the art would have recognized that while Batchelder used immediate laser curing at deposition of a first building material to prevent deformation, the need for immediate curing was obviated by Lawton's approach using a second building material deposited by either ink jet coating or built up from a bath of building material selectively cured with a radiation beam 107 scanned or moved over the building material to form each successive layer (Figure 1, column 6 lines 52-57). Lawton's scanning radiation beam can be formed by an X-Y mirror scanning apparatus (column 6 line 54) or a scanning laser beam (column 6 lines 54-55), e.g., from a laser diode (column 16 lines 33-37), etc. Therefore, the combination of Batchelder and Lawton involves the selective laser curing of built up uniform layers (using a plurality of laser diode light-emitting centers as taught by Batchelder, column 9 lines 57-66, that are scanned over each uniform layer) to form three-dimensional solid objects (as taught by Lawton and pointed out above).

In response to Applicant's argument on pages 20-21 that Batchelder and Lawton cannot be combined since they use different building materials and correspondingly different laser diode light intensities, the fact that Applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). One of ordinary skill in the art would expect that the degree of light intensity used for curing would necessarily have to be tailored to the specific type of building material that was cured. This realization does not preclude the combination of these references, but rather gives a

motivation to combine the advantageous features of each reference in order to achieve a desired improvement. At least one reason for combining Lawton with Batchelder would be to ensure building up of uniform successive layers of photo-activatable building material (e.g., to improve the resulting built up product, etc.), each successive layer being selectively cured by a plurality of higher intensity scanning laser diode light-emitting centers (e.g., to allow faster curing over what could be achieved by a single lower intensity scanning laser diode, etc.). Thus, Lawton specifies methods to obtain more uniform layers of building material and uses selective curing by scanning of each successive layer, while Batchelder suggests a means for faster curing of each built-up layer by using a plurality of laser diode light-emitting centers.

On pages 21-22, Applicant again asserts that neither Batchelder nor Lawton raises the applicator used to lay down building material. However, as already pointed out in a previous Office action, Batchelder has expressly stated the intention to not only raise the applicator during deposition of each layer of building material, but also describes alternative use of an applicator nozzle having three or more degrees of movement (column 6, lines 25-28). Likewise, Lawton's ink jet applicator could have been raised for each additional layer as an alternative to lowering of the support table. Besides, Applicant has already admitted that raising the applicator incrementally upward after application of each layer was already known in the art at the time of the invention (instant page 4, lines 22-24).

Applicant alleges on pages 22-24 that the combination of Batchelder, Lawton, Gelbart, Lin, and Mercer fails to teach or even suggest scanning a layer of building material with a plurality of light-emitting centers. As discussed above, Batchelder

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teaches use of plural nozzle applicators for laying down building material with each nozzle having associated imaging laser diodes (which are understood to be useful for the laser light curing and therefore read on a plurality of light-emitting centers). Lawton provides the laser scanning aspect for selective curing of each layer of previously applied building material to form a three-dimensional solid object. Therefore, one of ordinary skill in the art would understand the combination of Batchelder and Lawton to suggest scanning a layer of building material with a plurality of light-emitting centers.

On pages 24-25, the Applicant has again traversed the withdrawal of apparatus claims 46-47 as non-elected. However, Applicant had already previously elected Group I claims 1-7 and 22-23 drawn a method of fabrication (process) *without* traverse, leaving all product and apparatus claims withdrawn as non-elected. Still, Applicant has argued that the subsequently added apparatus claims 46-47 are part of the same group as the previously elected method claims, stating that these apparatus claims are drawn to systems for performing the processes of claims 1 and 26, respectively; and further asserting that apparatus claims 46-47 are linking claims (now newly argued to be in means-plus-function format). Yet, this argument is still not persuasive.

First, the process of claim 1 requires that the light-emitting centers be “moved over the layer” of photo-activatable building material, but this limitation is not specifically required by the apparatus of claim 46. Also, the apparatus of claim 46 requires means for depositing the building material “to a preselected surface”, but this limitation is not specifically required by the method of claim 1. Thus, it is believed that the apparatus of claim 46 could be used to practice another and materially different process than that of claim 1, such as a process that does not require light-emitting centers

to be *moved over the layer* of photo-activatable building material. Similarly, the apparatus of claim 47 could be used to practice another and materially different process than that of claim 26, such as a fabrication process that does not use a curing *oven*. Thus, these inventions are distinct and restriction for purposes of examination is proper.

Second, MPEP § 806.05(e) states, in part, “It should be noted that a claim such as, ‘An apparatus for the practice of the process of claim 1, comprising...’ and then the claim continues with purely apparatus limitations, is *not* a linking claim.” (Emphasis added). Therefore, claims 46-47 are not linking claims as asserted by Applicant and the previous election of the method claims without traverse is still binding.

Third, Applicant now argues that the apparatus claims 46-47 are in means-plus-function format, which suggests that the apparatus of claims 46 and 47 may be capable of performing the methods of claims 1 and 26, respectively. However, this is not the criterion used to determine distinctiveness for the purpose of restriction. Instead, only one-way distinctiveness is needed to support restriction between apparatus claims 46-47 and corresponding process claims 1 and 26, respectively. This analysis has been presented above.

Fourth, even if claims 46-47 were to be considered for examination, then they would be rejected under the second paragraph of 35 USC 112, at least because the phrase “the method” in each of claims 46-47 lacks proper antecedent basis.

Conclusion

Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Ruggles whose telephone number is 571-272-1390. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

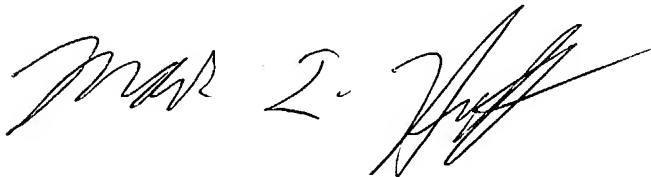
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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John Ruggles
Examiner
Art Unit 1756



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